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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Field of the Invention]This invention supports the follower roller allocated so that a paper feed roller may be contacted, enabling free rotation, and relates to a paper feed roller at the follower roller unit in which elastic energization is possible.

[0002]

[Description of the Prior Art]The feed drive of the paper is carried out with the paper feed roller of one shaft shape rotated in the paper feeder style which supplies a paper from the paper sheet supply part in a printer, a facsimile machine, etc., and two or more follower rollers allocated so that this paper feed roller might be contacted. For example, the printer is provided with the paper feeder style 101 which sends in the paper 100, and the print head 102 of the reciprocation type printed on the paper 100 under transfer as shown in drawing 4. The one paper feed roller 103 and two or more follower rollers 104 are formed in the paper feeder style 101, and the printed paper 100 is discharged in the direction of an arrow by the paper ejecting roller 105 to rotate and two or more star wheels 106.

[0003]Drawing 5 is an outline top view of the important section of the paper feeder style 101. Two or more follower roller units 110 are allocated in the paper feed roller 103 upper part in parallel.

The paper feed roller 103 is the structure which applied many ceramic particles to the surface of metal roller bodies via acrylic lacquer, for example. As shown in drawing 6, each follower roller unit 110, It comprises the roller holder 111 made of a synthetic resin, one pair of follower rollers 104 pivoted by the tip part of this roller holder 111 via the one pivotally supporting pin 112, the torsion spring 113 which carries out elastic energization of the roller holder 111 to the direction of the paper feed roller 103, etc. The torsion spring 113 is supported pivotably by the

common long shaft member 114, enabling free rotation.

[0004]Plurality stands to the rear-face side of the upper wall part of the roller holder 111, a rib is formed, the undersurface of these **** rib is formed in the slideway of the curvature shape to which it shows the paper 100, and the roller holder 110 is supported pivotably by the machine frame back members of a printer via one pair of pin parts 115, enabling free rotation. The follower roller 104 is the structure which formed the thin rubber layer in the peripheral face of the roller body made of a synthetic resin, for example, and performed Teflon coating to the peripheral face of the rubber layer. The one pivotally supporting pin 112 equipped with one pair of follower rollers 104 is removably attached from the undersurface side of the roller holder 110.

[0005]

[Problem(s) to be Solved by the Invention]Since it is the structure which the conventional follower roller unit illustrated to drawing 4 - drawing 6 twisted with a roller holder, two follower rollers, and pivotally supporting pins, and combined at least five parts of a spring, the manufacturing cost of parts not only becomes expensive, but the assembly expense which assembles these five parts becomes expensive. And some gross weight of a follower roller unit also becomes heavy. Especially the roller holder made of a synthetic resin simplifies structure, and small size and when carrying out a weight saving, it is disadvantageous. the purpose of this invention is to lessen the part mark of a follower roller unit remarkable, to boil the manufacturing cost and assembly expense of parts markedly, and to reduce them.

[0006]

[Means for Solving the Problem]In [a follower roller unit of claim 1 supports a follower roller allocated so that a paper feed roller may be contacted, enabling free rotation, and] a follower roller unit in which elastic energization to a paper feed roller is possible, Elastic energization of a roller holder holding said follower roller and this roller holder was carried out, and a torsion spring which carries out elastic energization of the follower roller at a paper feed roller was provided, it twisted with said roller holder, and a spring consisted of metal wire rods which have elasticity continuously.

[0007]For example, since two or more follower roller units are allocated in the one paper feed roller upper part in the shape of parallel and elastic energization of two or more follower rollers of these follower roller unit is carried out at a paper feed roller, a paper can be sent with a paper feed roller to rotate and two or more follower rollers. Here, one follower roller unit may have composition which has one pair of roller holders continuously prolonged, respectively from one pair of torsion springs formed continuously and in parallel, and these torsion spring, for example.

[0008]Carry out elastic energization of a roller holder holding a follower roller, and this roller holder, and a torsion spring which carries out elastic energization of the follower roller at a

paper feed roller is provided in a follower roller unit, simplifying structure of a roller holder, since it twisted with a roller holder and a spring was continuously constituted from metal wire rods which have elasticity -- small size -- a weight saving can be carried out and a manufacturing cost of a roller holder can be reduced. And part mark are reduced with twisting with a roller holder and constituting a spring continuously, parts manufacturing expense can be reduced, and since it is not necessary to twist to a roller holder and to attach a spring, assembly expense of a follower roller unit can also be reduced.

[0009]In [a follower roller unit of claim 2 supports a follower roller allocated so that a paper feed roller may be contacted, enabling free rotation, and] a follower roller unit in which elastic energization to a paper feed roller is possible, A supporting shaft part which supports said follower roller pivotably enabling free rotation, and a roller support frame part mostly prolonged continuously in orthogonal shape from an end of this supporting shaft part, With the metal wire rods which have elasticity, a torsion spring part which follows this roller support frame part was formed continuously, and a follower roller was supported pivotably for it in said supporting shaft part, enabling free rotation.

[0010]Said torsion spring part carries out elastic energization of a supporting shaft part and the roller support frame part to the paper feed roller side, and this torsion spring part is pivoted rotatable by shaft member provided separately. For example, two or more follower roller units are allocated in the one paper feed roller upper part in the shape of parallel, and since elastic energization of two or more follower rollers of these follower roller unit is carried out at a paper feed roller, a paper can be sent with a paper feed roller and two or more follower rollers.

[0011]Since a supporting shaft part in a follower roller unit, a roller support frame part, and a torsion spring part that follows this roller support frame part were continuously formed with the metal wire rods which have elasticity, simplifying structure of a roller support frame -- small size -- a weight saving can be carried out, part mark can be lessened remarkable, and a manufacturing cost of parts is boiled markedly and can be reduced. and assembly expense can also be markedly boiled by reduction of part mark, and it can decrease.

[0012]In [a follower roller unit of claim 3 supports a follower roller allocated so that a paper feed roller may be contacted, enabling free rotation, and] a follower roller unit in which elastic energization to a paper feed roller is possible, One pair of supporting shaft parts which support said follower roller pivotably enabling respectively free rotation, and one pair of roller support frame parts mostly prolonged continuously in orthogonal shape, respectively from an end by the side of phase approach of these supporting shaft part, One pair of torsion spring parts in which it is one pair of torsion spring parts which follow these roller support frame part, respectively, and both roller support frame part and an opposite side edge part were formed continuously, It formed continuously with the metal wire rods which have elasticity, and a follower roller was supported pivotably in said one pair of supporting shaft parts, enabling

respectively free rotation.

[0013] Since a follower roller unit of this claim 3 is the same as that of what arranges and twisted a follower roller unit of claim 2 to 2 symmetry, and was continuously constituted in an end of a spring part, it does so the same operation as a follower roller unit of claim 2 fundamentally. However, since reduction of much more part mark can be aimed at as compared with a follower roller unit of claim 2, it is much more advantageous in respect of reduction of a manufacturing cost.

[0014] In claim 2 or an invention of 3, said torsion spring part is supported pivotably via a shaft member, enabling free rotation, and a follower roller unit of claim 4 is taken as the constituting feature so that elastic energization of a supporting shaft part and the roller support frame part might be carried out to the paper feed roller side by this torsion spring part. Here, said torsion spring part is supported pivotably by member of an outer side of a follower roller unit via a shaft shaped member, enabling free rotation. A member common to two or more follower roller units may be sufficient as said shaft member, and a member individual to each follower roller unit may be sufficient as it. Elastic energization of a supporting shaft part and the roller support frame part is carried out to the paper feed roller side by a torsion spring part, and elastic energization of the follower roller is carried out at a paper feed roller.

[0015] A follower roller unit of claim 5 formed in said roller support frame part and parallel state an auxiliary frame part mostly prolonged continuously in orthogonal shape from the other end of said supporting shaft part in an invention of claim 4. In not providing an auxiliary frame part, there is a possibility that an end of a paper by which paper feed is carried out may run aground to the supporting shaft part and follower roller upper part, but. Since an auxiliary frame part mostly prolonged continuously in orthogonal shape from the other end of a supporting shaft part is provided, a paper can be guided in an auxiliary frame part and a paper can be prevented from interfering with a supporting shaft part and a follower roller.

[0016]

[Embodiment of the Invention] Hereafter, an embodiment of the invention is described based on a drawing. This embodiment is an example at the time of applying this invention to the paper feeder style of a printer, and as shown in drawing 1, the paper feeder style 1 comprises the paper feed roller 2 rotated with the driving force of the electric motor besides a graphic display, two or more follower roller units 3, etc.

[0017] The paper feed roller 2 is a thing of the structure which adhered many ceramic particles to the surface of metal roller bodies uniformly, for example, mix many ceramic particles in acrylic lacquer, and apply uniformly on the surface of a roller body, it is made to dry, and it is manufactured. The feeding performance stable since the frictional force which acts between the paper feed roller 2 and the paper 4 became large by many aforementioned ceramic particles is obtained.

[0018]As shown in drawing 1, 3 sets of follower roller units 3 are allocated in the paper feed roller 2 upper part in parallel, but drawing 1 may show the important section of the paper feeder style 1, and more follower roller units 3 than 3 sets may be formed. These follower roller unit 3 supports the follower roller 5 allocated so that the paper feed roller 2 may be contacted, enabling free rotation, and carries out elastic energization at the paper feed roller 2. Each follower roller unit 3 consists of one pair of supporting shaft parts 6 parallel to one pair of follower rollers 5, and the paper feed roller 2, one pair of roller support frame parts 7, one pair of torsion spring parts 8, and one pair of auxiliary frame parts 9. One pair of follower rollers 5 are supported pivotably by one pair of supporting shaft parts 6, respectively, enabling free rotation.

[0019]One pair of roller support frame parts 7 are mostly prolonged continuously back in orthogonal shape, respectively from the end by the side of one pair of phase approach of the supporting shaft part 6. One pair of torsion spring parts 8 have the spring body part 8b and the upper arm part 8c which were made into the lower arm part 8a two or more rolls, respectively. The lower arm part 8a of one pair of torsion spring parts 8 follows one pair of roller support frame parts 7, respectively, and is really formed in them. Both the roller support frame part 7 and opposite side edge part (upper bed part of the upper arm part 8c) of one pair of these torsion spring parts 8 are continuously formed via the loop part 10. As shown in drawing 1 and drawing 2, one pair of auxiliary frame parts 9, one pair of supporting shaft parts 6, one pair of roller support frame parts 7, and one pair of torsion spring parts 8 are continuously formed with the metal wire rods (for example, wire rod made from the stainless steel about the outer diameter 1.5 [about] - 2.0 mm) which have elasticity.

[0020]The spring body part 8b of said torsion spring part 8 is supported pivotably by the machine frame of a printer via the shaft member 11 common to two or more follower roller units 3, enabling free rotation. The upper arm part 8c of each torsion spring part 8 is caught by the machine frame back members of a printer from the undersurface side, and is restrained. Elastic energization of the roller support frame part 7 and the supporting shaft part 6 which stand in a row in the torsion spring part 8 by each torsion spring part 8, the follower roller 5, and the auxiliary frame part 9 is carried out by predetermined energizing force (for example, about 5N) to the paper feed roller 2 side.

[0021]The exterior of two or more spacers 12 of the pipe shape of the product made of the synthetic resin for carrying out position regulating of the follower roller unit 3 or metal is carried out to said shaft member 11, and position regulating is carried out to it so that the follower roller unit 3 may not move to shaft orientations (longitudinal direction). One pair of auxiliary frame parts 9 are mostly prolonged continuously back in orthogonal shape, respectively from the other end (a phase approach side edge part and the end of an opposite hand) of one pair of supporting shaft parts 6, and are formed in one pair of roller support frame parts 7, and

parallel state. The convex bends 7a and 9a for guidance are formed in the roller support frame part 7 and the auxiliary frame part 9 under [for guiding the paper 4]. The follower roller 5 cuts the tube (for example, the outer diameter of about 5 mm and about 3 mm in inside diameter) made from the synthetic resin material (for example, Teflon) of low friction to predetermined length (for example, about 10-15 mm), and is constituted.

[0022]In the above paper feeder style 1, since elastic energization of two or more follower rollers 5 is carried out at the paper feed roller 2, if the paper feed roller 2 rotates in the direction of an arrow in the case of feeding, the feed drive of the paper 4 will be certainly carried out to the front with the paper feed roller 2 and two or more follower rollers 5. Since many ceramic particles have adhered to the surface of the paper feed roller 2, a slip does not arise between the paper feed roller 2 and the paper 4. Since the follower roller 5 was constituted from a synthetic resin material of low friction and the inner surface of the follower roller 5 and an outside surface turn into a field of low friction, it becomes easy to rotate the follower roller 5, becomes difficult to wear an outside surface out, and excels in endurance. And since the follower roller 5 can be manufactured by cutting a tube to predetermined length, the manufacturing cost of the follower roller 5 can be reduced extremely.

[0023]Since one pair of supporting shaft parts 6 and one pair of roller support frame parts 7 in the follower roller unit 3, one pair of torsion spring parts 8, and one pair of auxiliary frame parts 9 were especially formed continuously with metal wire rods with elasticity, part mark can be reduced remarkably. For example, conventionally which was shown in drawing 6, in elegance, when it is 5 part necessity, it can constitute from three parts, and also this follower roller unit 3 also simplifies the structure of the roller support frame part 7 remarkably, it can carry out a small weight saving and can reduce remarkably the manufacturing cost of the roller support frame part 7.

[0024]Thus, since the part mark of the follower roller unit 3 can be reduced substantially, parts manufacturing expense can be reduced remarkably. Since part mark decrease, assembly expense can also be boiled markedly and can be reduced, and the manufacturing cost of the follower roller unit 3 can be reduced remarkably after all. Since the auxiliary frame part 9 mostly prolonged continuously in orthogonal shape from the other end of the supporting shaft part 6 was formed in the roller support frame part 7 and parallel state, the paper 4 can be prevented from guiding the paper 4 in the roller support frame part 7 and the auxiliary frame part 9, and interfering with the supporting shaft part 6 and the follower roller 5. When manufacturing the follower roller unit 3, after carrying out the fabricating operation of the metal wire rods to the beginning, in order to give spring nature to the torsion spring part 8, temper processing is heated and carried out to about 300 **, the follower roller 5 is attached after that, and curvature forming of the auxiliary frame part 9 is carried out.

[0025]Next, the change gestalt which changed said embodiment selectively is explained.

1) The follower roller unit 3 of each class in said embodiment may be constituted in 2 sets of follower roller units of the structure divided in the center section of the loop part 10. The roller holder in which the follower roller unit in that case holds the follower roller 5 enabling free rotation, It comprises continuously metal wire rods in which it has the torsion spring part 8 which carries out elastic energization of this roller holder, and carries out elastic energization of the follower roller 5 at the paper feed roller 2, and it twists with a roller holder and the spring part 8 has said same elasticity. However, said supporting shaft part 6 and the roller support frame part 7 are equivalent to a roller holder. Also in this follower roller unit, the almost same operation as the aforementioned embodiment and an effect are done so.

[0026]2) The follower roller unit 3 of each class in said embodiment may be constituted in 2 sets of follower roller units of the structure divided in the center section of the loop part 10. The supporting shaft part 6 in which the follower roller unit in that case supports the follower roller 5 pivotably enabling free rotation, The roller support Rehm part 7 mostly prolonged continuously back in orthogonal shape from the end of this supporting shaft part 6, About the torsion spring part 8 which follows this roller support frame part 7, it becomes a thing of the structure which formed continuously and supported the follower roller 5 pivotably in said supporting shaft part 6 with the metal wire rods which have said same elasticity enabling free rotation. Also in this follower roller unit, the almost same operation as the aforementioned embodiment and an effect are done so.

[0027]3) As shown in drawing 3, one pair of snap rings 13 which omit said spacer 12, instead regulate the axial position (longitudinal-direction position) of the spring body part 8b of the torsion spring part 8 of the follower roller unit 3 may be formed. In addition, it is feasible with the gestalt which added various change to the follower roller unit of said embodiment in the range in which this invention does not carry out meaning deviation.

[0028]

[Effect of the Invention]simplifying the structure of a roller holder, since according to the invention of claim 1 it twists with a roller holder and a spring is continuously constituted from metal wire rods which have elasticity, as mentioned above -- small size -- a weight saving can be carried out and the manufacturing cost of a roller holder can be reduced. And part mark are reduced with twisting with a roller holder and constituting a spring continuously, and parts manufacturing expense can be reduced, since it is not necessary to twist to a roller holder and to attach a spring, the assembly expense of a follower roller unit can also be reduced, and the manufacturing cost of a follower roller unit can be boiled markedly, and can be reduced.

[0029]Since the supporting shaft part in a follower roller unit, the roller support frame part, and the torsion spring part that follows this roller support frame part were continuously formed with the metal wire rods which have elasticity according to the invention of claim 2, simplifying the structure of a roller support frame -- small size -- a weight saving can be carried out, part mark

can be lessened remarkable, and the manufacturing cost of parts is boiled markedly and can be reduced. and assembly expense is also markedly boiled by reduction of part mark, and it can decrease, and the manufacturing cost of a follower roller unit can be boiled markedly, and can be reduced.

[0030]Since one pair of supporting shaft parts, one pair of roller support frame parts, and one pair of torsion spring parts that follow these one pairs of roller support frame parts, respectively were continuously formed with the metal wire rods which have elasticity according to the invention of claim 3, Since the same effect as claim 2 is done so and also reduction of much more part mark can be aimed at as compared with the follower roller unit of claim 2, it is much more advantageous in respect of reduction of a manufacturing cost.

[0031]According to the invention of claim 4, since a torsion spring part is supported pivotably via a shaft member, enabling free rotation and carries out elastic energization of a supporting shaft part and the roller support frame part to the paper feed roller side by this torsion spring part, elastic energization of the follower roller can be certainly carried out to a paper feed roller by a torsion spring part.

[0032]According to the invention of claim 5, since the auxiliary frame part mostly prolonged continuously in orthogonal shape from the other end of a supporting shaft part was formed in a roller support frame part and parallel state, a paper can be guided in an auxiliary frame part and a paper can be prevented from interfering with a supporting shaft part and a follower roller.

[Translation done.]